

Chapter 2 Results: National Needs

Total National Needs and State Highlights

The total reported POTW needs for the Nation as of January 1, 2004, are \$202.5 billion (Figure 2-1 and Table 2-1). More than 65 percent of the Nation's needs are for wastewater treatment, collection, and conveyance. As with the CWNS 2000, all the needs presented in this chapter are documented.¹²

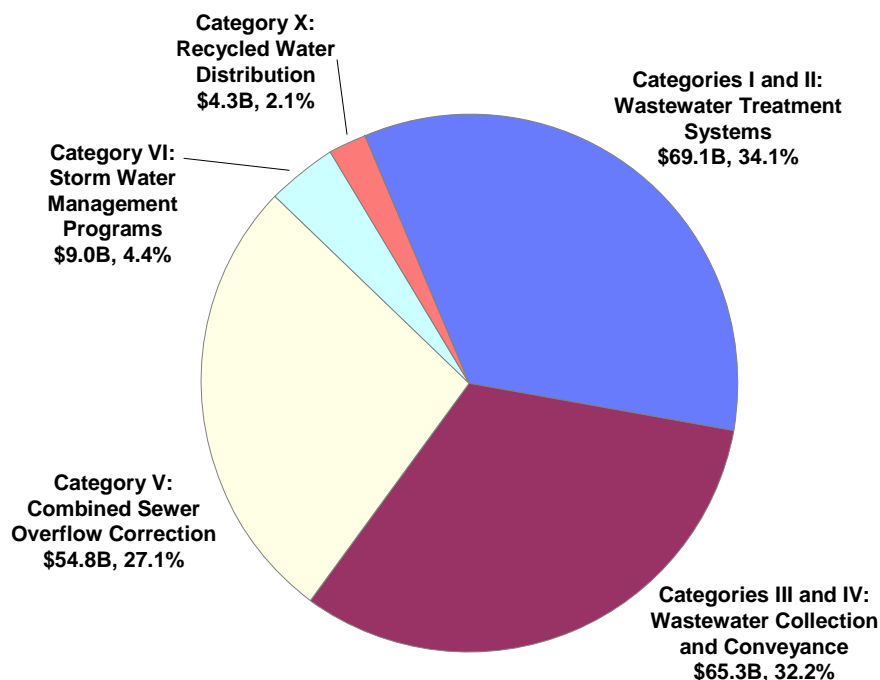


Figure 2-1. CWNS 2004 total documented needs (January 2004 dollars in billions).

¹² The surveys performed in 1992 and 1996 presented a combination of documented and modeled needs.

Table 2-1. Total Documented Needs Reported in the CWNS 2004 (January 2004 Dollars in Billions)

		Total Needs	
Needs Category		\$B	Percent
I	Secondary wastewater treatment ^a	44.6	22.0%
II	Advanced wastewater treatment ^b	24.5	12.1%
III-A	Infiltration/inflow correction	10.3	5.1%
III-B	Sewer replacement/rehabilitation	21.0	10.4%
IV-A	New collector sewers and appurtenances	16.8	8.3%
IV-B	New interceptor sewers and appurtenances	17.2	8.5%
V	Combined sewer overflow correction	54.8	27.1%
VI	Stormwater management programs	9.0	4.4%
X	Recycled water distribution ^c	4.3	2.1%
Total Categories I–VI and X		202.5	100.0%

^a In previous surveys, Category I included individual septic system and decentralized sewage treatment need

^b This category may also include additional process units to increase level of treatment to allow for water reuse.

^c New category for CWNS 2004, previously reported as Categories I, VII-D and VII-E

Notes:

Costs for operation and maintenance are not included.

For needs by category and State, see Appendix A, Table A-1. Needs estimates presented in Table 2-1 might vary slightly from those presented in the text and the appendices because of rounding.

Figure 2-2 displays the geographic distribution of the total documented needs by State. The largest reported total publicly owned treatment work needs occur in New York and California, both with more than \$20 billion in needs. Florida, Illinois and Ohio each have needs in excess of \$10 billion. The States with the largest increases in publicly owned treatment works needs since 2000 are Florida, California, Ohio, Minnesota, Michigan, Wisconsin, Oregon and Missouri, each with an increase of more than \$1 billion. Three-fourths (76.8 percent) of the total needs reported are concentrated in 18 States, while 20 States each reported less than 1 percent of the total needs. Appendix A (Table A-1) presents the total needs for all categories by State.

Figure 2-3 displays per capita needs by State. The highest per capita needs tend to be in States in the Mid-Atlantic and New England, as well as Hawaii, Arizona, Illinois and Ohio. The States with the largest needs per capita are the District of Columbia (\$3,670), Hawaii (\$1,660) and West Virginia (\$1,400). While the District of Columbia, Hawaii, West Virginia and Rhode Island have per capita needs exceeding \$1,000 per person, none of these States rank among the 20 States with the highest total needs shown in Figure 2-2.

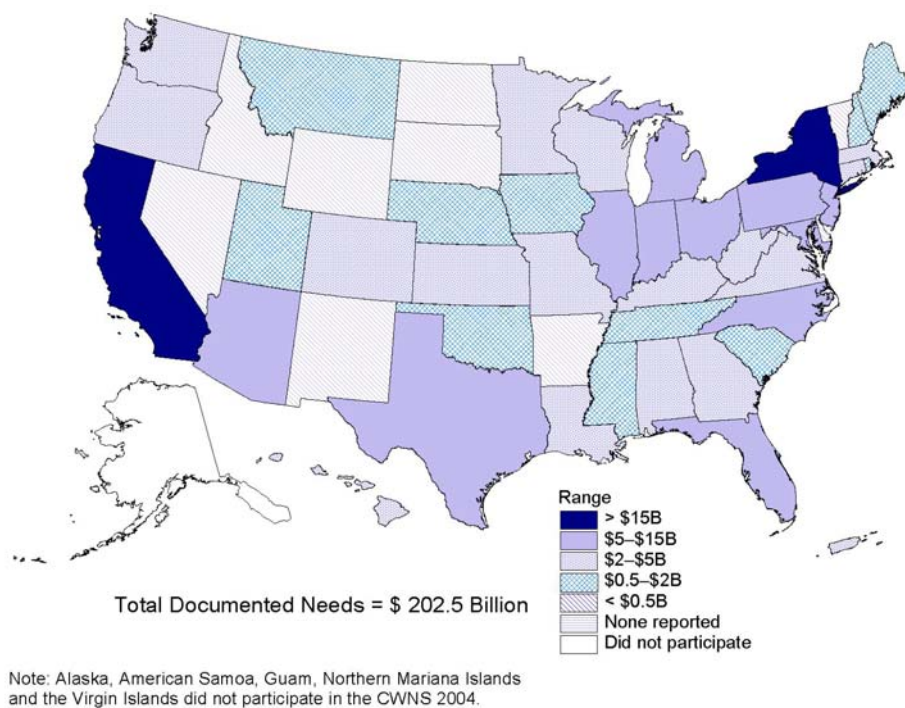


Figure 2-2. Distribution of total documented needs by State (January 2004 dollars in billions).

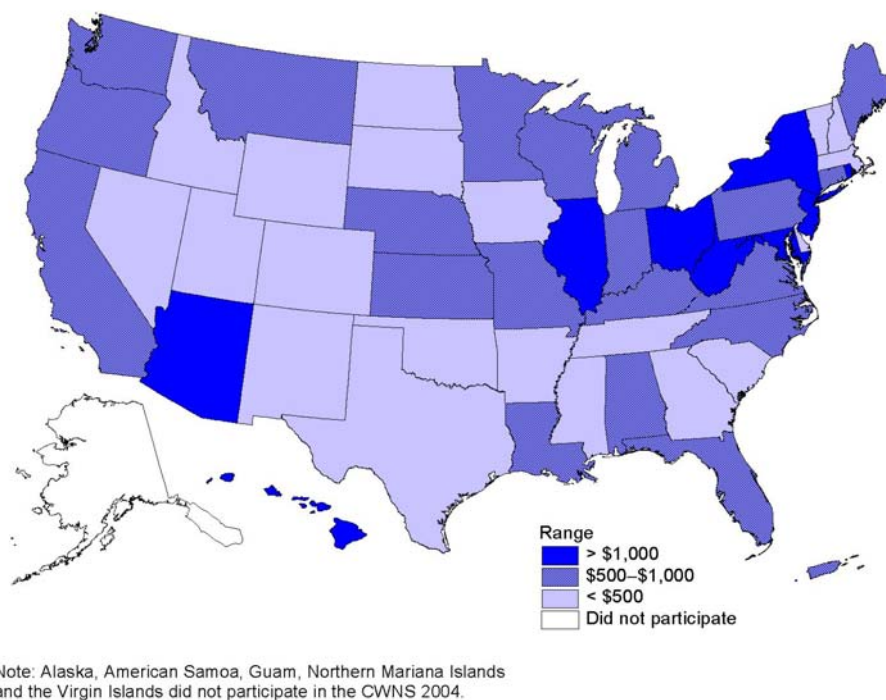


Figure 2-3. Distribution of per capita documented needs by State (January 2004 dollars/person).

Trends and Analyses by CWNS 2004 Category

Wastewater Treatment, Collection, and Conveyance (Categories I through V)

The needs reported (in January 2004 dollars) for the wastewater treatment and collection categories (Categories I through V) increased from \$180.2 billion in the CWNS 2000 to \$189.2 billion in this Report. This is a \$9.0 billion (or 5.0 percent) increase (Figure 2-4 and Table 2-2). Most (94 percent) of this increase can be attributed to needs increases of more than \$100 million each in only 92 of the 10,152 facilities with reported needs. An additional 78 facilities had needs that decreased by at least \$100 million each.

The most significant increase in needs related to wastewater treatment and collection are the following: Category I, increased by \$3.6 billion; Category III-A and III-B, by \$3.5 billion; and Category II, by \$1.8 billion. The \$3.6 billion increase in Category I needs is effectively a \$6.6 billion increase considering that the \$3.0 billion in individual septic system and decentralized sewage treatment needs, reported under Category I in CWNS 2000, is now reported in Category VII-L. Increases in Categories I and II could be due to a variety of issues. These include rehabilitation of aging infrastructure, facility improvements to meet more protective water quality standards, and in some cases, providing additional treatment capacity for handling wet-weather flows.

New needs (needs reported for the first time) account for \$10.0 billion of the Category I needs, \$7.6 billion of the Category II needs and \$5.6 billion of the Category III-B needs. The amounts for projected facilities are \$2.1 billion in Category I needs and \$3.6 billion in Category II needs. By definition, Category III-B needs would be entered only for existing facilities.

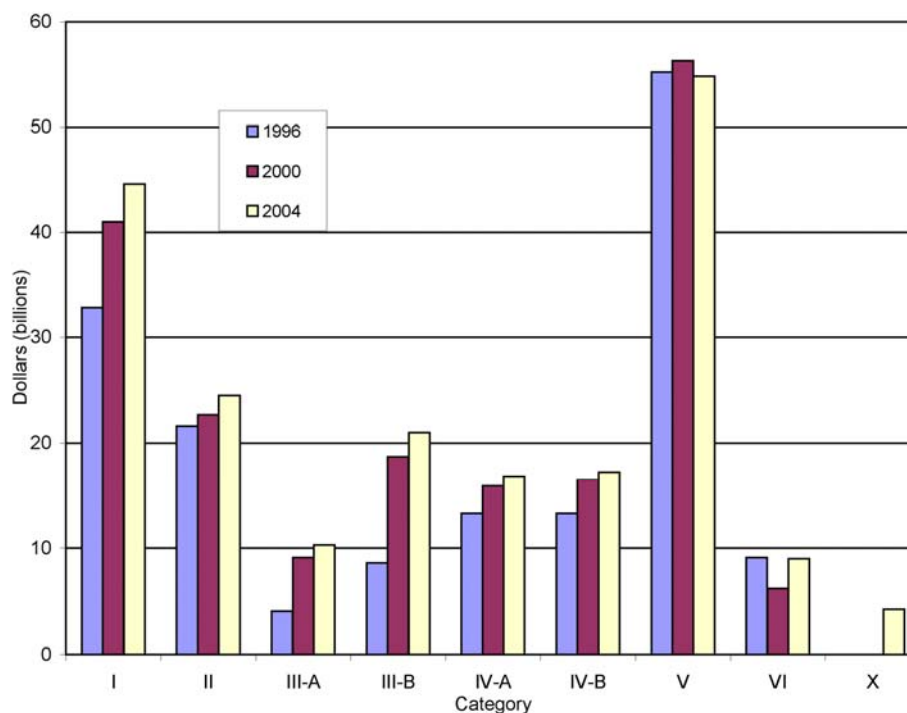


Figure 2-4. Total needs nationwide for the 1996–2004 CWNS organized by category (January 2004 dollars in billions).

Table 2-2. Comparison of Total Needs for the 1996–2004 CWNS (January 2004 Dollars in Billions)

		'00 – '04 change				
Needs Category		1996 ^a	2000 ^a	2004	\$B	%
Publicly Owned Wastewater Treatment and Conveyance Systems and Stormwater Management Programs						
I	Secondary wastewater treatment ^b	32.8	41	44.6	3.6	8.8%
II	Advanced wastewater treatment ^c	21.6	22.7	24.5	1.8	7.9%
III-A	Infiltration/inflow correction	4.1	9.1	10.3	1.2	13.2%
III-B	Sewer replacement/rehabilitation	8.6	18.7	21.0	2.3	12.3%
IV-A	New collector sewers and appurtenances	13.3	15.9	16.8	0.9	5.7%
IV-B	New interceptor sewers and appurtenances	13.3	16.5	17.2	0.7	4.2%
V	Combined sewer overflow correction	55.2	56.3	54.8	-1.5	-2.7%
VI	Stormwater management programs ^d	9.1	6.2	9.0	2.8	45.2%
X	Recycled water distribution ^e	- -	- -	4.3	4.3	NA
Total Needs for Categories I-VI and X		158	186.4	202.5	16.1	8.6%
Treatment Categories I and II only		54.4	63.7	69.1	5.4	8.5%
Collection and conveyance Categories III and IV only		39.3	60.2	65.3	5.1	8.5%
Category I to V subtotal		148.9	180.2	189.2	9.0	5.0%

^a The needs from 1996 and 2000 were inflated to January 2004 dollars for comparison with CWNS 2004 data.

^b In previous surveys Category I included individual septic system and decentralized sewage treatment need

^c This category may also include additional process units to increase level of treatment to allow for water reuse.

^d Modeled needs in 1996.

^e New category for CWNS 2004, previously reported as Categories I, VII-D and VII-E

Wastewater Treatment

Almost half of the \$69.1 billion secondary and advanced wastewater treatment needs were reported by New York (\$11.9 billion), California (\$11.5 billion), Florida (\$4.6 billion), New Jersey (\$3.3 billion) and Maryland (\$3.0 billion). States with increases of more than 50 percent since 2000 in Categories I and II include Oklahoma (147 percent), Oregon (88 percent), Tennessee (84 percent), Idaho (70 percent), Kansas (65 percent), Washington (64 percent) and Colorado (60 percent). Notably, Puerto Rico, which did not participate in the previous survey, reported \$1.0 billion in Category I and II needs.

Table 2-3 shows the total Category I and II needs and their distribution related to infrastructure improvement versus capital renewal for wastewater treatment plants.

The 28.8 percent (\$19.9 billion) of projects resulting in infrastructure improvements is a decrease from the 36.1 percent reported in 2000. Capital renewal projects also accounted for 28.8 percent of needs, a decrease from the 32.4 percent reported in 2000.

The remaining \$29.3 billion (42.4 percent) is associated with projects that represent a combination of infrastructure improvements and capital infrastructure renewal, an increase from the 31.5 percent reported in 2000.

Infrastructure Improvements

Activities such as increasing the effluent quality level (e.g., from secondary to advanced treatment), increasing the plant capacity to keep up with population growth, and constructing new wastewater treatment plants.

Capital Renewal Projects

Projects that sustain the current level of performance of the plant by implementing rehabilitation, refurbishing or replacing capital assets to restore an asset, facility or system to its original condition and function. Such projects do not increase treatment capacity or effluent quality level. Examples include replacing coarse bubble diffusers with fine bubble diffusers or switching from disinfection by chlorination to ultraviolet disinfection. Capital renewal does not include costs for routine operation and maintenance at wastewater treatment plants.

Secondary Treatment

A treatment level that will meet an effluent quality of 30 mg/L (30-day average) of both 5-day biochemical oxygen demand (BOD₅) and total suspended solids, although secondary treatment levels required for some lagoon systems might be less stringent. In addition, the secondary treatment must remove 85 percent of BOD₅ and total suspended solids from the influent wastewater.

Advanced Treatment

A treatment level that is more stringent than secondary or produces a significant reduction in nonconventional or toxic pollutants present in the wastewater effluent.

Table 2-3. Category I and II (Wastewater Treatment) Needs (January 2004 Dollars in Billions)

Wastewater Treatment Plant Investment	Jan 2004 (\$Billions)	Percentage of Total	Number of Facilities
Infrastructure improvements	19.9	28.8%	2,527
Capital renewal	19.9	28.8%	2,224
Combination of infrastructure improvements and capital renewal	29.3	42.4%	887
Total	69.1	100.0%	5,638

Collection and Conveyance

More than 37 percent of the \$65.3 billion in Category III and IV needs was reported by California (\$6.4 billion), Florida (\$4.4 billion), Ohio (\$3.6 billion), Texas (\$3.5 billion), New York (\$3.3 billion) and North Carolina (\$3.1 billion). States with increases of more than 50 percent since 2000 in Category III and IV needs include Minnesota (199 percent), Idaho (144 percent), the District of Columbia (102 percent), North Dakota (100 percent), Tennessee (89 percent), Wisconsin (75 percent) and Oklahoma (73 percent). Notably, Puerto Rico, which did not participate in the previous survey, reported \$2.7 billion in Category III and IV needs.

An assessment similar to the Category I and II needs comparison above was also performed for Category III and IV needs. Category III needs generally represent capital renewal needs. Category IV needs usually represent infrastructure improvement. Exceptions include some needs in Category IV-B that are related to projects (e.g., new relief sewers, sewer separation) traditionally thought of as capital renewal projects.

Of the total Category III and IV needs of \$65.3 billion, 47.9 percent of the needs are associated with Category III. This compares with 46.2 and 32.3 percent for the CWNS 2000 and CWNS 1996, respectively.

This pattern of an increasing proportion of Category III needs is further evidence that communities are continuing to plan for the correction of problems related to SSOs,¹³ as well as ensuring the reliability of the Nation's existing collection system infrastructure.

Sewer Rehabilitation and Replacement Needs

Category III-A and III-B needs are for inflow/infiltration (I/I) correction and sewer replacement or rehabilitation. I/I occurs when flow from wet-weather conditions enters collection systems through various means, such as pipe cracks and broken joints.

New Sewer Needs

Category IV-A and IV-B needs are for new collector and interceptor costs.

¹³ Note that in addition to Category IV-B (new interceptor sewer and appurtenances), some needs in Category I (secondary wastewater treatment) and Category II (advanced wastewater treatment) might also address SSO problems.

Combined Sewer Overflows

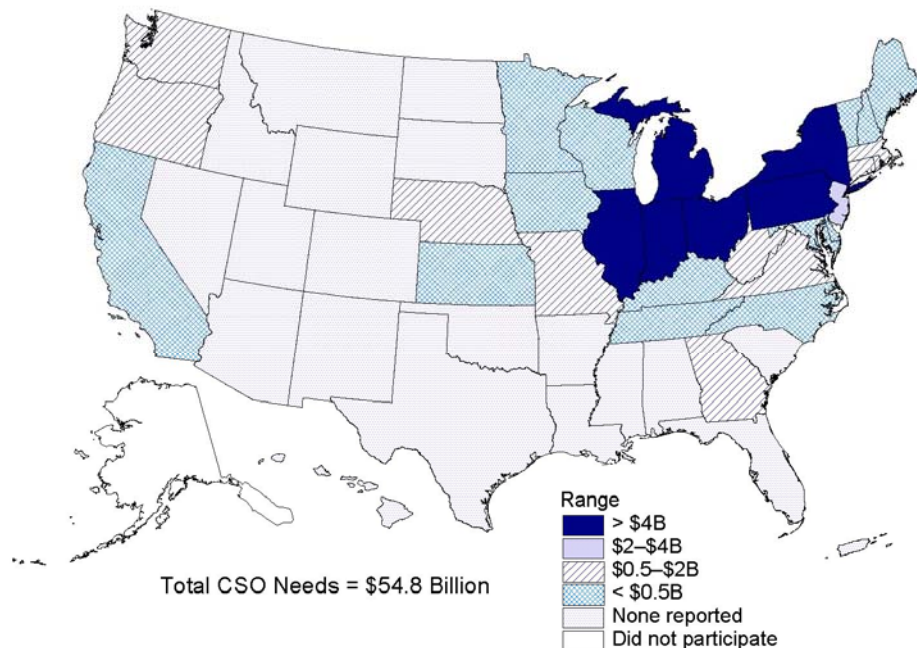
Of the \$54.8 billion in needs to control CSOs, 75 percent was reported by Illinois (\$10.1 billion), New York (\$6.6 billion), Ohio (\$6.3 billion), Indiana (\$5.4 billion), Pennsylvania (\$4.6 billion), Michigan (\$4.3 billion) and New Jersey (\$3.8 billion). These reported needs are similar to those of the CWNS 2000, in which the same seven States accounted for 71.7 percent of the total Category V needs. These seven States also account for 550 of the 747 facilities with Category V needs. Twenty-three States and the District of Columbia account for the remaining 197 CSO facilities with \$13.7 billion in Category V needs.

Unlike the increases reported in all other needs categories, the total needs estimate for the control of CSOs decreased by a total of \$1.5 billion from the CWNS 2000. The Category V needs for Ohio and Michigan increased by \$2.3 billion and \$1.6 billion, respectively, whereas the needs for Pennsylvania, Iowa and New Jersey decreased by more than \$1 billion each.

Figure 2-5 shows the distribution of Category V needs by State. Appendix C, Table C-4, presents the number of facilities with Category V needs by State and the total Category V needs for the CWNS 2000 (inflated to January 2004 dollars) and the CWNS 2004.

Combined Sewer Overflows (CSOs)

Wet-weather events are known to cause a variety of water quality problems throughout the Nation. Under various circumstances, precipitation in the form of snow or rain generates runoff that can be contaminated by a number of different pollutant sources (e.g., industrial operations, roadways, and land use practices). Where combined sewer systems are in use, wet-weather contributes to CSOs. CSOs contain not only storm water but also untreated human and industrial waste, toxic materials and debris. These materials can be a major water pollution concern for cities with combined sewer systems.



Note: Alaska, American Samoa, Guam, Northern Mariana Islands and the Virgin Islands did not participate in the CWNS 2004.

Figure 2-5. Distribution of CSO correction (Category V) needs by State (January 2004 dollars in billions).

As with other needs categories, States were requested to enter documented needs when available. During the CWNS 2004, States increased their use of LTCPs to enter cost estimates. Sixteen States documented CSO (Category V) needs using LTCPs for 144 facilities, up from 34 facilities in the CWNS 2000. Needs documented in LTCPs account for 13.3 percent (up from 7.7 percent) of the Category V needs reported in this survey. LTCPs provide the most reliable estimates for CSO control based on the 1994 CSO Policy. Appendix C, Table C-6, presents a list of 59 facilities, with CSO needs exceeding \$120 million, that used cost curves for estimating costs in this Report.

When LTCPs or other engineering and planning documents were not available, States could use cost curves to estimate Category V needs. The cost curve methodology for the CWNS 2004 was the same as that used for the CWNS 1996 and CWNS 2000. The cost curve is based primarily on the *Presumption Approach* in the 1994 CSO Policy.¹⁴ For the CWNS 1996, 66 percent of the CSO needs were documented by using cost curves. This percentage decreased to 53.4 percent for the CWNS 2004.

In August 2004, EPA released *Report to Congress: Impacts and Control of CSOs and SSOs*, hereinafter called *the CSO/SSO Report*. In the report, EPA documented that 746 communities with CSOs in 31 States and the District of Columbia have been issued 828 CSO NPDES permits that regulate 9,348 CSO discharge points. In many cases, the facility associated with a CSO community or a CSO permit in the CSO/SSO Report is one of the 747 facilities with CSO correction needs reported in the CWNS 2004. However, because of the complexity associated with permitting CSOs and the varied ownership, in particular for satellite collection systems, the number of facilities reported here cannot be directly compared with the number of CSO permits or the number of CSO communities reported in the CSO/SSO Report.

Municipal Stormwater Management Programs

Almost 79 percent of the \$9.0 billion in needs for developing and implementing municipal stormwater management programs were reported by Texas (\$2.8 billion), Florida (\$2.2 billion), Arizona (\$1.2 billion) and Minnesota (\$0.9 billion). Category VI needs increased by \$2.8 billion from the CWNS 2000.

Large and medium MS4s account for 77.8 percent, or \$7.0 billion, of the total stormwater management program needs. Small MS4s account for the remaining 22.2 percent, or \$2.0 billion in stormwater management program needs.

Municipal Storm Water Management Programs

In response to the 1987 Amendments to the CWA, EPA published regulations implementing Phase I of the NPDES Storm Water Program in 1990. Under Phase I, EPA required NPDES permit coverage for storm water discharges from *medium* and *large* MS4s. The Phase I MS4 requirements apply to systems in incorporated areas or in counties that EPA has identified as having MS4s serving populations of 100,000 or more. They also apply to systems that the EPA Administrator or the State has designated. The Phase II Final Rule, also a result of the 1987 CWA Amendments, was published in the *Federal Register* on December 8, 1999. It requires NPDES permit coverage for storm water discharges from *small* MS4s, which are systems in urbanized areas as defined by the U.S. Census Bureau (USEPA 1999).

Phase I regulations are applicable to large and medium MS4s, as well as some small MS4s (serving populations of fewer than 100,000 people) that participated in Phase I for various reasons. Some small MS4s are included in the Phase I program as *co-permittees* because they are interconnected with nearby medium or large MS4s. Small MS4s already in the Phase I program will not be required to develop Phase II programs.

¹⁴ Under the 1994 CSO Control Policy *Presumption Approach*, a facility is presumed to provide an adequate level of control if it (1) Has no more than an average of four overflow events per year, with permitting authority ability to allow up to two additional overflow events per year; or (2) Eliminates or captures for treatment no less than 85 percent by volume of the combined sewage collected during precipitation events; or (3) Eliminates or removes no less than the mass of the pollutants, identified as causing water quality impairment through a sewer system characterization, monitoring and modeling effort (USEPA 1994).

The distribution of stormwater management program needs by State is presented in Figure 2-6. Appendix A, Table A-1, presents the stormwater management program needs by State. Appendix C, Table C-5, presents stormwater management program needs by State for large, medium and small MS4s.

Municipal stormwater management program needs in this Report were underreported, though to a significantly lesser extent than for the CWNS 2000. Twenty-eight States and the District of Columbia entered needs for 1,255 municipal stormwater management facilities in this Report. As of January 1, 2004, 1,018 Phase I NDPS MS4 permits, covering 887 municipal entities in 44 States, had been issued. EPA estimates that there are between 5,000 and 6,000 Phase II MS4 entities in the Nation, although only a fraction of those were under permit as of January 1, 2004.

Lack of resources to document stormwater management program needs and the inability of States to obtain the required data from various municipal entities were the main reasons for the States not including their Phase I Stormwater Management Program needs.

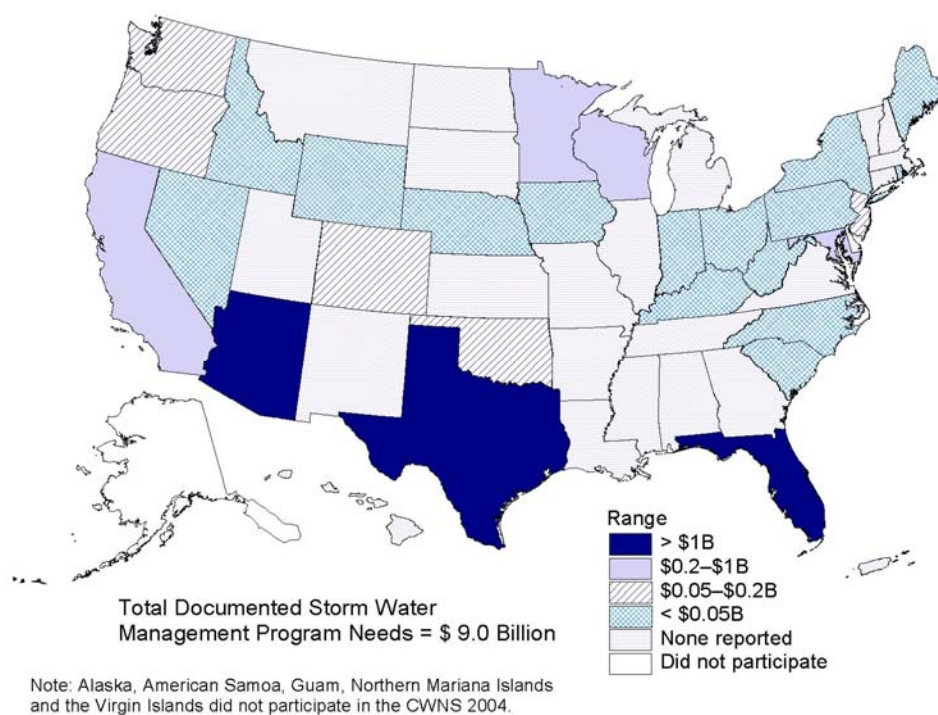


Figure 2-6. Distribution of stormwater management program (Category VI) needs by State (January 2004 dollars in billions).

Recycled Water Distribution

Fifteen States reported \$4.3 billion in recycled water distribution (Category X) needs. California (\$1.9 billion) and Florida (\$1.7 billion) accounted for 84 percent of the Category X needs. With this category being new for this Report, needs in this category are likely to increase in future surveys as identified projects and documentation become more available.

Urban and Rural Communities Needs

The breakdown of urban and rural total documented needs is \$133.6 billion (66 percent) and \$68.9 billion (34 percent), respectively. The total urban needs for Categories I through VI are \$130.9 billion; the total rural needs for these categories are about half as much, \$67.3 billion.

For urban areas, 80 percent of the needs are in Categories V (\$42.6 billion), I (\$30.1 billion), III-B (\$15.0 billion), II (\$13.1 billion) and III-A (\$7.1 billion).

For rural areas, 80 percent of the needs are in Categories I (\$14.5 billion), V (\$12.2 billion), II (\$11.4 billion), IV-A (\$8.7 billion), and IV-B (\$8.2 billion). These numbers convey the greater relative needs for installing new pipes in rural areas versus repairing pipes and addressing CSOs in urban areas.

Small Community Needs

Small communities have estimated needs of approximately \$17.0 billion (see Appendix A, Table A-3), representing about 9 percent of the \$193.5 billion documented needs in Categories I-V and X.

Wastewater treatment needs (Categories I and II), conveyance needs (Categories III and IV) and CSO correction needs (Category V) for small communities are \$5.0 billion, \$10.4 billion and \$1.6 billion, respectively. State-by-State presentations of various aspects of small community needs are provided in Tables A-3 through A-10 and Table A-13 in Appendix A.

Figure 2-7 shows the distribution of small community needs by State. Pennsylvania (\$1.5 billion), West Virginia (\$1.4 billion) and New York (\$1.1 billion) account for 23.5 percent of the small community needs. Nine additional States report between \$0.5 billion and \$1.0 billion in small community needs. With few exceptions, small community facilities are a large majority of the total number of publicly owned facilities in each State. It is noteworthy that 90 percent or more of the facilities in four States (Iowa, Kansas, Nebraska and West Virginia) serve small communities. Moreover, in eight additional States, small community facilities constitute 80 to 90 percent of the publicly owned facilities.

Recycled Water Distribution

These needs include any costs associated with conveyance of the recycled water (wastewater reused after removal of waste contributed by humans) and any associated rehabilitation or replacement needs. The costs of the pipes used to convey treated water from the wastewater facility to the drinking water facility are an example of needs in this category.

Urbanized Areas

Data from the CWNS 2004 and information on urbanized areas from the U.S. Census Bureau were used to determine the breakdown of needs in urban and rural areas in the continental United States. An urbanized area, as defined by the U.S. Census Bureau, generally consists of a large central place and adjacent densely settled census blocks (1,000 people per square mile for geographic core of block groups or blocks, or 500 for adjacent block groups and blocks) that together have a total population of at least 2,500 for urban clusters or at least 50,000 for urbanized areas.

Small Communities

Small, rural communities are defined as communities with populations of fewer than 10,000 people and an average daily wastewater flow of less than 1 million gallons. These communities often lack the technical, financial, and managerial capacity to optimally construct, operate, manage and maintain wastewater treatment facilities or systems.

Figure 2-8 shows a comparison of the number of facilities, population served and needs for small and large communities in the Nation. Figure 2-9 shows this information for three ranges of small community populations served.

Although about 70 percent of centralized wastewater treatment and collection facilities serve small communities, those facilities serve only 10 percent (27.2 million people) of the population served by centralized collection. While 60.1 percent of non-small communities have documented needs, only 36.6 percent of small communities have documented needs, indicating potential underreporting.

Of the 1,552 new wastewater treatment facilities identified in the CWNS 2004, 827 facilities will serve small communities where individual onsite systems are expected to be abandoned. The majority (75 percent) of the new small community treatment plants that are replacing individual onsite systems will serve populations of fewer than 1,000 people. The 827 facilities will provide service to approximately 681,715 people and account for \$0.6 billion in Category I and II needs and \$1.4 billion in Category IV-A and IV-B needs.

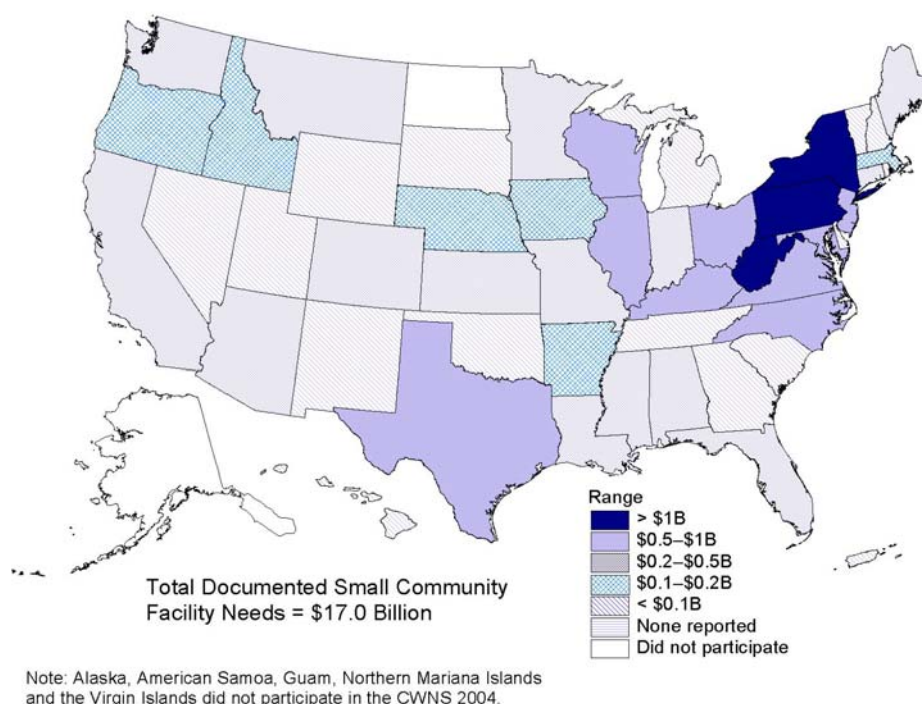
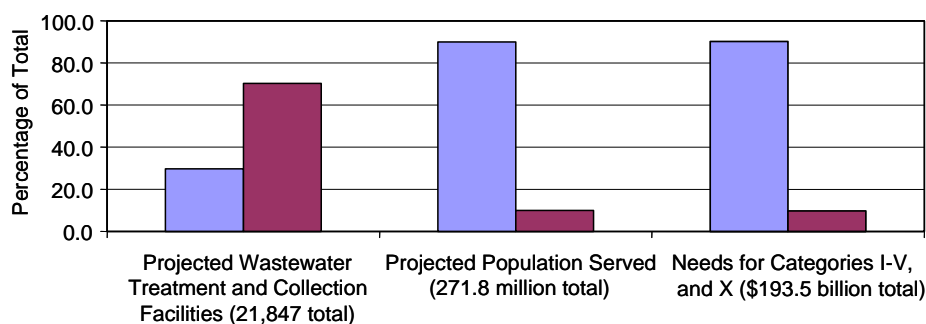


Figure 2-7. Geographic distribution of small community needs (January 2004 dollars in billions).



This figure contains technical data for facilities that were updated or verified by States and accepted by EPA in the CWNS 2004. Facilities from States that did not participate in the survey or those facilities that were not updated for lack of resources are not included in the figure. Because of these analysis methods, the numbers in this figure cannot be directly compared with the numbers in Appendix C.

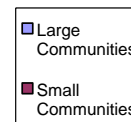


Figure 2-8. Comparison of small versus large community needs and technical information from existing and projected facilities.

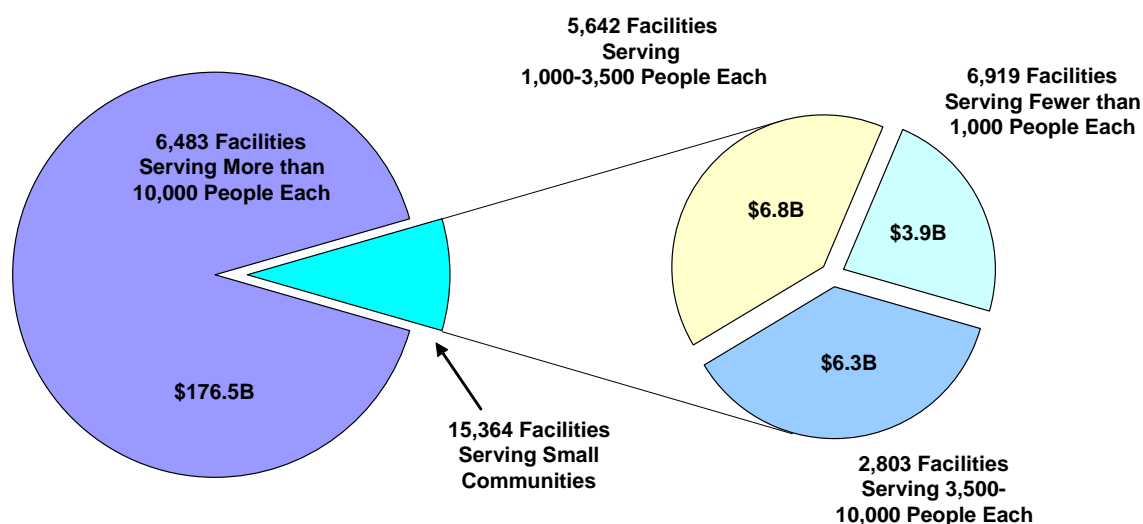


Figure 2-9. Number of projected centralized wastewater treatment and collection facilities by ranges of population served with needs if all documented needs are met.

Other Documented Needs

Appendix A, Table A-2 and Appendix E summarize \$38.3 billion in NPS needs that met CWNS documentation requirements and are not defined under CWA section 516(b)(1)(B). This includes \$3.0 billion in needs to address failing individual septic and decentralized wastewater treatment systems.¹⁵

¹⁵ Needs to address failing septic and decentralized wastewater treatment systems were reported in Category I in previous surveys.

Separate State Estimates

Forty-three States reported SSEs of \$40.2 billion. SSEs are needs that did not meet CWNS documentation criteria but were entered for State purposes other than this Report, such as State-level planning as well as communication with State legislatures and other groups involved with addressing and preventing water quality problems. Tables A-11, A-12 and A-13 in Appendix A present the total SSEs for each category, State by State.